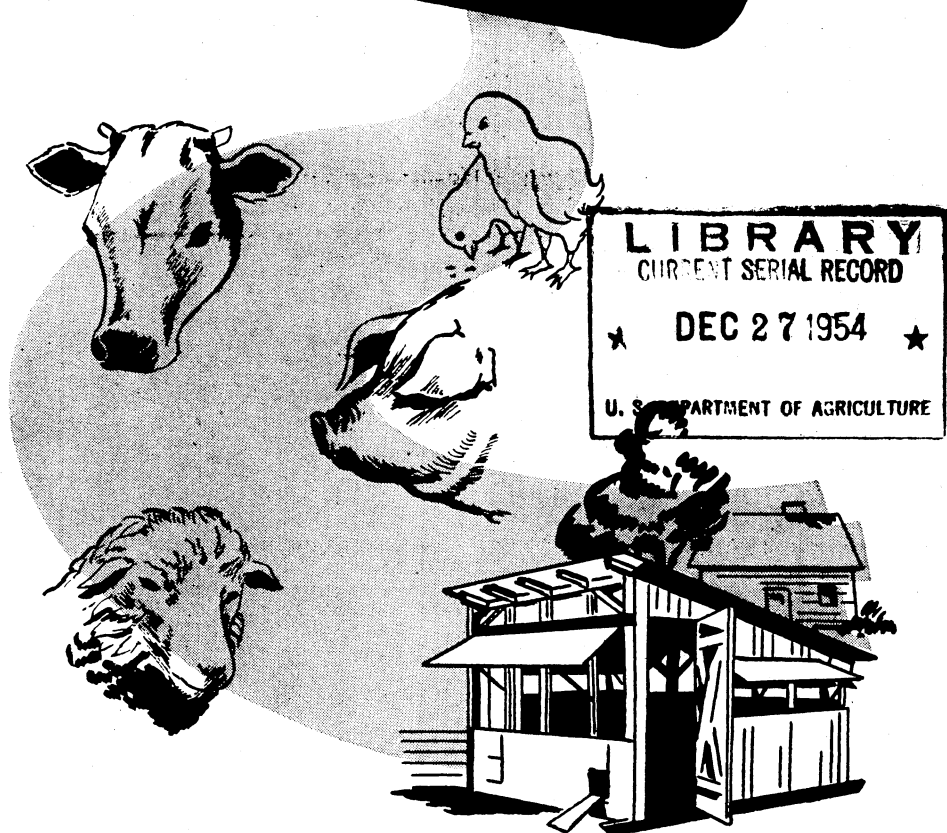


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LIVESTOCK for Small Farms



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THIS PUBLICATION is intended for families on small farms that are expected to furnish only a part of the family income or living. Persons owning larger farms or living in localities where there are special markets for some products will ordinarily need to modify methods presented here.

The text deals with essentials of small-scale production of livestock and their products and is intended also to help the inexperienced landowner choose the kind of stock that will best suit his needs. Cooperative facilities are recommended in order to make available to groups valuable services which individuals cannot economically supply themselves.

For detailed publications containing more complete information on the subjects presented, readers should apply to their State colleges of agriculture, county agricultural agent, or the United States Department of Agriculture, Washington 25, D. C.

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LIVESTOCK FOR SMALL FARMS

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Kinds of Livestock for Small Farms

THE OWNER OR OPERATOR of a small tract should consider raising some kind of livestock in addition to the customary garden. Almost any kind of livestock will supplement his income, but he must take into consideration the initial cost of the stock, the availability and cost of feed, and the labor necessarily involved. He will find in many cases that certain kinds of livestock are not suited for small farms. The chief advantages in having livestock on small tracts are to provide food for the family and salable products, to utilize wastes, and also to supply manure to build up soil fertility.

Such animals as chickens or other poultry, rabbits, hogs, and, in some cases, milk goats or cows are well suited to small farms. Although some kind of mechanical power will be needed for plowing, the owner of a small tract can usually hire this work done. However, the opportunity to do odd jobs about the neighborhood, such as hauling, cultivating, or similar work, may in some cases justify keeping a horse or a mule.

Chickens

Almost any small farm can provide facilities for a flock of chickens. A flock of 10 to 25 birds may be large enough for a beginning.

¹ Acknowledgment is made to various specialists of the Bureaus of Animal Industry and Dairy Industry for their co-operation.

With good care they will supply fresh eggs and meat at a low cost, especially if table scraps are used to supplement other feed. Even a small yard can usually accommodate enough hens to supply eggs and table poultry for the average family. The manure may be used on the garden, thus reducing the outgo for commercial fertilizer. A flock may become a source of income where there is a good local demand for fresh eggs and home-dressed poultry. In the average family there is usually someone who can do the routine tending of the flock, and the heavier work may be done at intervals with the aid of other members of the family.

A building about 8 by 10 feet, suitable for a flock of 25 laying hens, may be built for as little as \$35, provided some or all of the materials can be obtained second-hand and some member of the family builds it. If the climate is such that a more substantial and warmly built house is required the cost will be closer to \$50. There may be additional outlay for fencing and for brooders.

Starting A Small Flock

Many breeds of chickens are suitable for small-farm flocks. For a flock primarily for egg production, one of the lighter breeds, such as the Leghorn, is advised. High fences are required to confine these birds, however, because of their tendency to fly.

For top-grade dressed poultry, one of the so-called general-purpose breeds is best. These include the Rhode Island Red, the Plymouth Rock, the New Hampshire, and the Wyandotte. They are especially suitable for small flocks and, if from a flock selected for high egg production, the hens will be good layers as well as good table fowls.

The heavy breeds, such as the Brahma and the Jersey Giant, make large roasters but are not so popular for all-round meat production as the general-purpose breeds.

Obtain stock only from a pure-bred flock, free from disease.

The most practical method for the beginner, especially one who wants a large flock of layers or who wants one of the popular breeds, is to buy day-old chicks. The cost is usually less than for buying hatching eggs and a small incubator. A further advantage in buying chicks is in getting them started earlier than waiting for hens to become broody.

Day-old chicks must be brooded artificially. Some poultrymen use home-made brooders successfully; others buy commercial brooders. Any building used for a brooder house should be well built and free from drafts. It should be large enough to allow at least 1 square foot of floor space for each 3 chicks. The kind of heat to be used for the brooder stove is unimportant so long as there is no fire hazard. Electric brooders are very satisfactory and offer less fire risk than those using coal or oil. If a part of the main dwelling or a nearby building is to be used, it is advisable to find out whether brooding conflicts with fire regulations and existing insurance policies.

One disadvantage of artificial brooding is that the chicks require much care and frequent attention while they are young. The beginner who prefers to avoid the expense and labor of brooding chicks may

buy 8-week-old pullets or even mature pullets that are ready to lay. Pullets of either age, however, cost more than younger stock.

Many commercial hatcheries now supply so-called sexed chicks. This permits flockowners to choose the sex best suited to their needs. One may also buy crossbred chicks in which the color of the males is slightly different from that of the females.

To have enough laying hens by fall or winter to provide eggs for a small family, the beginner should hatch or buy at least 3 dozen chicks. This allows for some losses from accident or disease, and for some culling. About half will be cockerels, which may be used for the table.

If possible, start a flock with chicks from an early hatch. Late hatches rarely do so well as early ones. March and April are the best months for hatching chicks in most areas.

The flock should not overcrowd the laying house. In building, allow at least 3 square feet of floor space for each grown bird. Crowding chickens in the house and keeping too many on a limited area are common causes of failure.

A small flock generally needs each year from 50 to 75 pounds of purchased feed per bird, depending on the quality and amount of table scraps fed, the kind of range, and the breed of chickens.

Additions or replacements of hens that are culled or that have died may be made by raising a new flock of pullets each year. New blood may be obtained by buying day-old chicks from a hatchery or from a reliable poultryman who has a large flock of hens and selects only his best individuals for use as breeders.

Incubating Eggs

Ordinarily it is not practical to hatch chicks on the farm, but the following recommendations are of-

ferred those who prefer to hatch rather than buy chicks. Select for hatching only fresh, even-sized eggs with strong shells, and keep them in a cool place not longer than 5 days. If a hen is to be used for hatching the eggs, give her no more eggs than she can fully cover. A hen of average size can cover 13 eggs. Set the hen in a nest away from other hens, with feed and water nearby. Supply her with whole grains and mash. Place the nest so that she will not have to fly up or jump into it. Before giving eggs to the hen, dust her with commercial sodium fluoride. (See p. 11.) As an insurance against mites it is well to paint cracks in the nest box lightly with anthracene oil or creosote oil.

Hens' eggs will hatch about 21 days after they are set. Remove the chicks from the nest about 24 hours after the last ones are hatched.

If an incubator is to be used, start it several days before the eggs are to be put in and see that it is properly regulated. Follow the directions of the manufacturer carefully, since different kinds of incubators vary in their adjustment, care, and operation.

Brooding Chicks

Brood artificially either day-old chicks from a hatchery or those hatched in an incubator on the farm. Chicks from a hatchery will usually arrive when they are 24 to 36 hours old, and they should go into a brooder at once. If chicks are hatched in a home incubator, they should remain there until they are about that age and then be put into a brooder.

When chicks are first placed in a brooder, maintain a temperature of 93° to 95° at 6 to 8 inches inside the edge of the hover and 3 inches above the floor. Gradually reduce the temperature so that it will be about 75° when the chicks are 5 to 6 weeks old. After the first day or two the temperature should be

governed largely by the behavior of the chicks. Crowding of the chicks to the outside of the brooder, panting, or hard breathing indicate too much heat. Huddling about the heater indicates the need for more heat. The brooder is at the proper temperature when at night the chicks spread out around the heater or just inside the fringe of the hover. Keep the brooder stove going day and night. Use a wire screen to confine the chicks close to the heater for the first 3 or 4 days until they learn to use the brooder.

Although heat is essential, it is also necessary that chicks have plenty of fresh air. The heating system itself will usually provide enough circulation. As soon as conditions are favorable, let the chicks go out of doors so that they may get plenty of sunlight and fresh air.

Clean the brooder or brooder coop every week, as cleanliness is essential to good health. Cover the floor with sand or litter to absorb the droppings. Keep the water dishes and feed trays clean.

Provide heat for the chicks until they are from 5 to 8 weeks old, depending on weather conditions and the development of the chicks. Provide low flat roosts to encourage the chicks to begin roosting early—at least by the time they are half grown.

If a partially heated room or basement is available, chicks may be raised to about 8 or 10 weeks in batteries. These are merely large cages built in tiers with feeders and waterers along the slatted sides. Some form of vitamin A and D feeding oil is supplied in the mash to offset the lack of direct sunshine.

Feeding Practices

Recently more and more poultrymen have come to rely on the products of commercial feed manufacturers rather than on home-mixed feeds. The commercial manufacturer has several important advan-

tages, among which are better control of the quality of ingredients, better mixing facilities for handling small quantities of high-potency vitamin and antibiotic supplements, and, usually, wider choice of ingredients. However, home-mixed feeds afford an opportunity to utilize home-grown materials.

The poultryman who mixes his own feed must be very sure to do the job thoroughly. He must rely on home feed formulas supplied by his county agent or his State extension office. These formulas are flexible in that they allow substitution of one ingredient for another, and they have been tested in feeding trials. Methods for mixing feeds can be obtained from the same sources as feed formulas. These methods should be followed with great care. It is important that the minute quantities of vitamins or antibiotics put into large batches of feed be uniformly blended with the feed. First mix such ingredients thoroughly with a small quantity of the feed. Then stir this mixture into the entire batch, taking care that it is evenly distributed throughout.

Mashes for all types of poultry are sometimes made into pellets to prevent waste, eliminate dust, and increase feed consumption. When feed consumption is abnormally low, as in severely cold weather or in the case of disease, the use of pelleted mash or table scraps may help birds to resume their normal feeding habits.

A commercial - f o r m u l a feed should be made for a specific purpose. The manufacturer should state on the tag or the bag itself the purpose for which the feed was made and the directions for feeding it. The purchaser should follow the manufacturer's directions specifically. For example, an all-mash system is one in which only mash is fed to chickens with no

grain at all. A mash-grain system is one in which both mash and scratch grains are fed in equal parts. The mashes with which the grain is to be fed contain greater quantities of nutrients than all-mashes. If grain is fed with an all-mash, the total intake of nutrients is reduced. Feeding such a ration is likely to bring about a particular nutritional deficiency which manifests itself in stunted growth in chicks and lowered egg production. No harm would result, however, if no grain were fed with a mash prepared to be fed with grain. The chickens would receive more nutrients than necessary, and the remainder of the nutrients would be wasted, and hence expensive.

Grain to be fed with mashes may be whole corn or a combination of corn, wheat, oats, and barley.

Feeding Baby Chicks

Starting mash and drinking water should be provided for baby chicks as soon as they are placed around the brooder and should always be available. To encourage the chicks to begin eating, supply feed not only in feeders but also on pieces of cardboard. The cardboard may be removed after the second day. Starting mash can be fed as an all-mash diet until the chickens are at least 4 weeks old. Fine grit may be mixed with the mash or supplied in separate hoppers.

As an alternative to this procedure, feed finely cracked corn instead of mash during the first 2 or 3 days after hatching. This practice helps to prevent the condition known as "pasting up," in which a mass of fecal material collects around the vent. "Pasting up" is usually evidence of irregularities in brooding temperature. Even without cracked corn, this condition should not occur if the temperature is regulated carefully—(95° F.) under the brooder during

the first week, with a drop of about 5° each week until a heated brooder is no longer needed. Do not feed cracked corn to newly hatched chicks longer than 3 days.

It is important to have enough feeding and drinking space. At first, 2 inches of space at the trough or self-feeder and one-half inch of space at the water fountain, should be provided for each bird. As chicks grow, their feeding and drinking space must be increased.

Young poultry should always be reared in complete isolation from adults because of the danger of contracting disease from them.

Feeding Broilers

Corn-gluten meal is a desirable ingredient in broiler mash because it increases the desired yellow pigment in the shanks and skin. Broiler mashes may be fed as all-mash diets until the birds are marketed, but the common practice is to feed some whole grain during the last few weeks before marketing. The birds should not have whole grain until they are at least 8 weeks old. Rapid growth is very important in broilers. For that reason do not replace broiler mashes with grain too early. These mashes supply the vitamins, antibiotics, minerals, and protein essential for quick gains.

Feeding Pullets for Flock Replacement

When pullets are from 6 to 8 weeks old, a change is usually made in their diet. Any one of three things may be done: They may be continued on the starting mash with grain in addition; they may be changed from the all-mash starter to an all-mash growing diet and continued on it until they are almost ready to lay; or they may have a growing mash plus a grain mixture.

Grain feeding is sometimes begun when chickens are 4 weeks old, but

it is not recommended for chickens younger than 6 to 8 weeks. Whenever the start, the quantity of grain should be small at first and increased gradually until, at about 15 weeks of age, the birds are eating equal parts of mash and grain. Since grain is ordinarily cheaper than mash, its use is economical. Grain, however, contains less protein and less of certain vitamins than mash. Its use is justified on nutritional grounds because the chicken's requirement for these vitamins in units per pound of feed decreases as the bird grows, and because as the bird grows it becomes less sensitive to decreased concentration and quality of protein.

It is common practice to rear pullets on range where they get plenty of exercise, green feed, and sunshine. In the hot summer months feed and water should be placed in the shade so that the birds may eat enough for satisfactory growth.

Limiting the supply of mash and grain will make pullets on range eat more grass, but such a practice is likely to decrease the rate of growth. It is well, therefore, always to have feed in the hoppers.

About 1 month before pullets are expected to begin laying, the growing mash should be gradually replaced by laying mash. Varying mixtures of the 2 mashes may be fed during a period of 2 weeks while the change is being made. If the growing mash and the laying mash used are similar in composition, the change may be made abruptly, but a gradual change is safer.

Fattening, or Finishing, Chickens

Finishing chickens for market is done most economically on a large scale at especially equipped feeding stations and probably should not be attempted by the small-flock owner under ordinary conditions. Finishing diets are usually fed as wet mashes, 2 or 3 times a day, to birds that are confined in fattening bat-

teries or in small pens. It is important not to overfeed on the first day. Beginning the second day, chickens should be given at each feeding as much as they will eat in half an hour.

Broilers may be fed a finishing diet for 1 to 2 weeks, but the finishing period for older birds is usually not longer than 1 week.

A good finishing mash may be made from equal parts of ground corn and finely ground oats plus 1.5 percent of ground limestone, with enough milk or whey added to make a mixture that will pour readily. If liquid milk or whey is not available, 9 parts of water and 1 part of dried milk byproduct may be used. Milk products in finishing mashes increase their palatability.

The simple combinations of feeds as described are suitable for finishing chickens on a small scale. If yellow pigmentation of shanks and skin is desired, as it often is in broilers, it would be well to use the yellow corn and corn-gluten meal in the mash. If yellow color is not desired, white corn and soybean meal should be used.

Feeding Layers

Laying mashes are essential for good egg production. To increase feed consumption, especially in cold weather, pellets, moist mash, or table scraps may be fed at noontime in addition to the laying mash. A small flock of 25 laying hens will do very well on table scraps in addition to the laying mash. Feed the mash in hoppers. Grain may be fed either in hoppers or on the litter. Insoluble grit should be supplied in separate hoppers.

Usually when grain is to be fed, additional limestone or crushed oystershell should be supplied in separate hoppers to supply the necessary calcium for normal eggshells. All-mash systems do not call for additional limestone or oystershell because the diet contains sufficient

calcium. Be sure to check with the manufacturer's directions.

For maximum egg production, keep mash, grit, and oystershell or limestone before layers at all times, and feed grain only in the evening.

The flockowner is especially concerned about feed because the outlay for it is the principal cost of producing eggs. Most hens lay well in spring, but in the summer or early fall they start to molt and lay few if any eggs for about 3 months. Since early pullets are usually ready to lay by October, it is wise to have at least half the flock made up of pullets, to supply eggs while prices are favorable. If the pullets are from bred-to-lay stock, and are well housed and fed, they should each lay about a dozen eggs in October and slightly more during each of the next 2 months. Yearling hens will average only about 4 eggs in October and 2 in November, as most of the hens will be molting. The average yearly egg production of a flock of hens well cared for should range from 120 to 160 per hen.

Laying hens of the light breeds, such as the Leghorns, consume, on an average, about 70 to 85 pounds of feed each year. Heavier hens, such as Plymouth Rocks and others of similar size, will consume about 80 to 95 pounds of feed each year. A flock of 30 Leghorns will eat about 3 pounds of scratch grain and 3 pounds of mash daily, while the same number of Plymouth Rocks will consume about 3½ pounds of each feed daily.

Houses and Equipment

It is often advisable for the beginner of moderate means to build a small, inexpensive poultry house that will serve for a year or two and later either add to this or build another house (fig. 1). Experience will reveal the requirements of the enterprise and will indicate more definitely the possibilities.

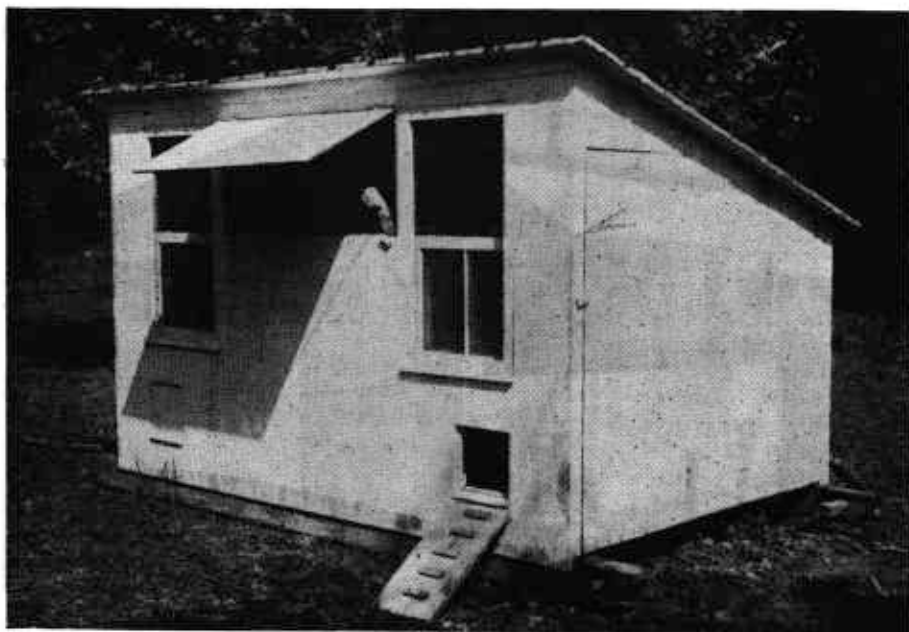


FIGURE 1.—A good type of house for a small flock of chickens. It has been placed on runners so that it may easily be moved to clean ground.

To save expense a dirt floor may serve on a light, well-drained soil, but it is not so satisfactory as a concrete or wooden floor. A concrete floor is the most desirable and most easily cleaned.

A small poultry house should be built to keep the birds dry, protect them from drafts in bad weather, provide ample ventilation in hot weather (fig. 2), and allow for easy tending of the flock. To allow comfortable working space, a house should be at least 6 feet high in front and $4\frac{1}{2}$ to 5 feet high at the rear.

The depth of the house is important because the deeper the house the less possibility of drafts reaching the birds when they are on the roosts at the rear. A depth of at least 10 feet is desirable, and houses 12 to 18 feet deep are much more comfortable.

A safe rule is to allow from 3 to 4 square feet of floor space for each bird to be housed. The lighter breeds, such as Leghorns and An-

conas, require less space than the heavier birds, such as Rhode Island Reds, Plymouth Rocks, and New Hampshires.

Ordinarily, a shed-roof type of house is the most economical to build. Place the roosts about $2\frac{1}{2}$ feet above the floor and install a droppings board 4 to 6 inches under them (fig. 3).

Droppings boards may not be necessary for a small flock but they will help to keep the litter clean and dry. They should be cleaned at least once a week. Some poultrymen use a pit just below the roosts. These have the advantage over droppings boards in that they require cleaning only once a month or so. Some say once in 3 months is often enough. Pits have disadvantages such as giving off offensive odors, and providing breeding places for flies and a harbor for rats.

Make the roosts of substantial material with the upper edges slightly rounded. Leghorns require 8 inches of perch room per bird and



FIGURE 2.—A house suitable for use in the South, as it provides plenty of ventilation during the summer. It is as important that the hens be comfortable in hot weather as it is in cold weather.



FIGURE 3.—Interior of a small chicken house showing roosts with droppings boards, nest built to the wall, and feed hoppers (at extreme left).

Plymouth Rocks or similar breeds, 10 inches per bird.

Locate the nests in convenient places. Many small-flock owners use egg or orange crates filled with straw. Sectional nests along the wall built in such a way that the hens may enter from the rear and the eggs may be removed from a special door at the front are better and tend to prevent egg eating. Provide a nest for about every 4 or 5 hens.

Install a coop for broody hens with a slat bottom for breaking up broodiness of any hens that want to set, unless they are needed for hatching eggs. Contrary to a common belief, broody hens need to be well fed in order to hasten their return to egg production.

Place a dry-mash hopper at a convenient location in the house. This saves time in feeding the flock, and also helps insure maximum production. Hoppers may be purchased ready-made or may be built at home. Two important features of self-feeding hoppers are that they make the mash readily accessible to the hens and they prevent excessive waste.

Drinking water should be accessible at all times; eggs contain about 65 percent of water. Set a large pan or pail in a square frame or box so that the vessel stands about 5 inches above the top of the frame. Make the frame large enough for the hens to stand on while drinking and high enough so that the top of the water vessel will stand about 18 inches above the floor. This will keep the vessel free from straw and dirt. Cover the vessel partially so that birds can drink easily but not get into or contaminate the water.

Keep plenty of clean straw or other litter on the floor. This will help to keep the house clean and the hens will exercise by scratching about in it. The litter should be about 2 inches deep and should be

renewed whenever it gets dirty. Damp litter may cause a decrease in egg production.

Many poultrymen prefer to keep the floors covered with deep litter by building it up to 6 or 8 inches in the fall before cold weather comes. If litter is kept dry by occasional stirring it provides good floor insulation and saves labor as it requires removal only once a year. However it does require extra labor for stirring.

A flock of 15 to 25 hens will require only a small yard, and it is usually more practical to provide one than to confine the flock indoors. If space outside the poultry house is limited, only a little time and material are required to install a wire-covered sun porch. This porch may be only about the size of the house but it should have a floor of cinders, concrete, or better, 1-inch-mesh wire netting stretched on a stout frame a few inches above the ground. This kind of yard is also very desirable for young chickens as it will keep out dogs, cats, and hawks. For a yard too large to cover with wire netting without undue expense, a fence at least 5 feet high is needed. If the birds are of the light breeds, it may be necessary also to clip the large feathers on one wing of each hen to keep them confined.

To prevent the soil from becoming contaminated with disease organisms and parasites from the droppings, it is advisable to cultivate the yard at least once a year, and, if possible, seed it to a green crop. A better plan is to provide two yards so that the hens may use one while the other is seeded to a green crop. Some flock owners keep the chickens confined to the house and sun porch during the summer and use the yard for a garden. Chickens use the yard the rest of the year. Hens may be kept confined to the house throughout the year with good results provided

vitamin A and D feeding oil is included in their feed. Some poultry raisers keep the hens confined to the house during the winter months.

Many commercial poultrymen use artificial lights in the laying house during the fall and winter months as a means of lengthening the hens' day and thereby stimulating egg production. This may be practical for small flocks also if the expense of installation is small. The usual practice is to use lights from the first of October until the latter part of March. The lights are usually turned on by an alarm clock about 4:30 a. m., kept on until daylight, and then turned off when the flock is fed in the morning. Lights are kept on long enough to give the hens about 12 to 14 hours of "working time" so that they eat more feed and lay more eggs.

Culling the Flock

One of the quickest methods of increasing the average egg production of a flock is to cull out the poorest layers. In the fall when the pullets begin to lay, the early maturing birds should be marked as good layers by placing a colored celluloid band on one leg. Mark also any hens that continue laying late in the summer and fall. These are known as persistent layers, and they will have bleached beaks and shanks. Hens that go broody should be marked to be sold later as their annual production will be considerably less than hens that do not go broody. During the summer and fall the poor layers will usually molt earliest. By careful observation of the flock, the poor layers can be culled out from time to time and only the best ones kept over for layers the following year.

It is well to bear in mind, however, that a hen's production gradually decreases as she gets older. It may pay to keep some hens the third year, but generally pullets should replace all the hens that are

more than 2 years old. The banding of the flock should therefore indicate the age of the birds as well as show which are the best producers.

Select only healthy, vigorous pullets that have grown well and have good body size. Select those with bright, full eyes, and with bright yellow pigmentation in the shanks and beak. Early maturing pullets make the best layers. Pullets of the Leghorn and other light breeds usually begin laying at 5 to 6 months of age and those of the heavier breeds at 6 to 7 months. When culling pullets, handle them as carefully as possible.

Preventing Disease

Generally it is easier to prevent disease from getting a start than to cure an ailment that appears in the flock. Sanitary conditions in the poultry house and yard will help to keep diseases and parasites out of the flock. Keep any land used for poultry free from contamination by regular cultivation and by growing grass, alfalfa, or other green crop. Some poultrymen lime their soil annually. It is of course necessary to keep poultry houses clean at all times and well littered with clean, dry straw or other suitable litter. Keep the houses free from dampness by providing good ventilation, but avoid drafts. Overcrowding should also be avoided as it tends to reduce the vitality of the birds.

As a necessary precaution against loss remove from the laying flock any diseased birds at the first indication of sickness.

Give the healthy members of the flock the first consideration as their welfare is of far greater importance than that of 1 or 2 sick birds. After the sick birds are culled out of the flock, clean out and disinfect the poultry house and cleanse thoroughly all feeding and drinking utensils.

If treatment of sick birds seems advisable, keep them separated from the rest of the flock. Quarantine birds suffering from contagious disease until all danger of contaminating the rest of the flock has passed. In many cases, in an outbreak of disease, it is better to kill the affected birds at once and burn them or bury them deeply. Do not allow birds that have died of disease to be fed to other animals.

It is a good plan to give the poultry house a thorough cleaning and disinfection every few months, especially after sick birds have been kept for treatment. Keep the poultry house free from mites by painting the roosts, roost supports, and nests with crude petroleum or anthracene oil.

It is also well to treat the birds with lice powder. One of the best of these is commercial sodium fluoride. Rub a small pinch of it into the feathers of the head, neck, back, breast, each thigh, below each wing, at the tail head, and under the vent. This is a very effective way of keeping fowls free of lice.

DDT and derris powder are both capable of killing poultry lice. They can be used as a dust or as a dip. For dusting purposes, a 10-percent DDT powder applied to individual birds with a shaker will destroy poultry lice but will not prevent reinfestation. About one-half ounce per bird is sufficient.

Producing High-Quality Eggs

The most desirable eggs are clean, full-sized eggs with sound shells, all of the same color. Interior quality of new-laid eggs is partially controlled by heredity, but careful management can do much to eliminate poor-quality eggs. The following directions should help flockowners obtain better eggs:

Keep the hens in a comfortable well-ventilated laying house and provide clean nests.

Keep the litter dry and do not allow the birds to run outside when the poultry yard is wet and muddy.

Gather eggs regularly, preferably 2 or 3 times daily during warm or very cold weather and once daily at other times.

Keep eggs in a cool place free from odors.

Keep all male birds out of the laying flock, except during the breeding season when hatching eggs are to be saved from the flock. Since males are not needed to make the hens lay, kill or sell any males that are not to be held over for the next breeding season.

All eggs sold to consumers should be candled to eliminate those with blood spots or poor interior quality. This will reduce complaints from customers.

Preserving Eggs

Ordinarily there will be a surplus of eggs in the spring and a shortage in the fall and early winter. For home use, some housewives follow the practice of preserving surplus eggs by oiling or by placing them in water glass or limewater. The easiest method is oiling. Obtain some clear, tasteless mineral oil at the drugstore or filling station. On the day after they are laid, dip clean eggs with sound shells in the oil. Both eggs and oil should be at room temperature. After the eggs have drained about 20 minutes, they can be placed in cartons or in an egg case. Oiled eggs will keep their quality for several months if kept in a reasonably cool place, such as a basement or cellar. It is not necessary to keep oiled eggs in a damp place.

Water glass may be obtained from drugstores as a thick syrup. This liquid is mixed with nine parts boiled water and poured in an earthenware crock or galvanized can which has been thoroughly cleaned. Fresh, clean eggs, free from cracks, are then placed in the liquid, with 2 inches of liquid over the top layer. The jars should be covered tight while in use. Keep the eggs cool as possible in a cellar or springhouse. A similar method

is to preserve eggs in a clear lime-water solution obtained by slaking 3 pounds of lime in 5 gallons of water. However, this method has never been widely used in the United States. Galvanized containers are not suitable for the lime-water solution.

The best method of preserving eggs is mechanical refrigeration. Clean, fresh eggs will keep 2 to 4 months in a household refrigerator, although they may develop rather large air cells. Eggs in their shells should not be placed in the home freezer.

Processing Chickens for the Table

The appearance and condition of dressed poultry depend greatly on the care used in the killing, packing, and cooling. Preferably, chickens should be dressed when the weather is cool, when they are to be used soon, or when it will take only a few hours to get them to market. No solid food should be given chickens for 24 hours before killing, but plenty of water should be supplied.

Market fowls may be either scalded and picked, or dry-picked after being killed. Scalding is the easier method. The water temperature makes considerable difference in the appearance of the scalded fowl, especially if it is air-cooled after dressing. If the scalding temperature is much above 130° F., the dressed poultry should be cooled in crushed ice or ice water for not over 6 hours. For best appearance, the birds should be slack-scalded at 125° to 130° F. for 20 to 30 seconds. Dry picking is more difficult, but it results in a much more attractive fowl, which will sell more readily on some markets. The dry-picking method requires a special method of killing the bird by cutting the jugular vein in the back of the mouth and sticking the knife blade into the brain through the roof of the mouth.

Capons

The capon is a castrated male chicken. Removal of the testes brings about marked changes in its appearance and activities. Five or six weeks after the removal, a capon grows more rapidly than a cockerel. The capon produces choice meat and brings a better price per pound than a cockerel. Capons are in greatest demand from Thanksgiving to March.

The best time for caponizing is in the late spring or early summer when the cockerels are from 10 days to 3 months of age. Capons require 7 to 9 months to grow and finish properly.

The most popular breeds for capon production are Plymouth Rock, New Hampshire, Rhode Island Red, and various crosses among them. Jersey Giants and Langshans produce larger capons but take longer to develop than the smaller breeds.

Most capons are marketed alive through poultry dealers who kill and prepare the birds for market. The methods of killing and plucking capons are about the same as those used for other kinds of poultry and are described in detail in Farmers' Bulletin No. 2030.

Ducks and Geese

Although the keeping of ducks or geese is seldom a suitable enterprise for the average small tract holder, there are conditions under which some kind of waterfowl will be profitable. If the farm contains or adjoins a stream or small lake, the keeping of such fowls merits consideration. One advantage in raising either ducks or geese is that they may be kept with less care and attention than a flock of chickens of the same number of birds. Geese, in particular, will get their entire living after the first few weeks from a good pasture so long as the grass remains green.

Anyone planning to keep waterfowl should obtain additional information on care and management from his county agricultural extension agent or from the U. S. Department of Agriculture.

Turkeys

Turkeys may be raised satisfactorily on small farms if they are kept in confinement, but the owner of a small farm should not attempt to utilize range. Turkeys may be given clover, lawn clippings, or other succulent green feed, which help to reduce production cost as well as to maintain a good growth rate.

The initial cost of day-old poults or hatching eggs is usually higher than that of other poultry, and the young turkeys require careful attention during brooding. Good management and disease control are essential to success. For such information consult Farmers' Bulletin 1409, Turkey Raising, obtainable from county agricultural extension agents or from the U. S. Department of Agriculture, Washington 25, D. C.

Never allow turkeys to run with chickens or on land used for or by chickens, as chickens often harbor blackhead and other disease-producing organisms which cause serious losses in turkeys.

Squabs

The family on a small plot of land where conditions are not favorable for raising chickens may find it practical to raise squabs for the home table and market. The advantages in raising squabs (young pigeons about ready to leave the nest) are that they require very little land, they usually bring good prices, and the pigeons themselves raise the young birds. However, the demand for squabs is not nearly so general as the demand for chickens and eggs.

The average annual return above feed cost can be estimated by using local prices, allowing an annual production of from 10 to 14 squabs for each pair of breeders, and a feed consumption of 90 to 100 pounds per pair. Additional income may often be obtained from the sale of breeding stock, especially from high-producing flocks.

The breeds of pigeons used for squab production should be prolific producers of good-size squabs. Give minor consideration to type and color. The greatest demand is for the breeds that produce good-size squabs with light-color skin. The King, Carneau, Mondaine, and Giant Homer are good producers of squabs of this type, and carefully selected stock of these breeds should produce squabs weighing from 14 to 24 ounces each, live weight, at 26 to 28 days of age.

Houses and Equipment

House the breeding stock in a special shed or loft where they may nest and rear their young. Adjacent to the loft construct an enclosed pen or fly, where the birds may fly about and where bathing water is kept (fig. 4). A loft may be built especially for housing the pigeons, but satisfactory results may be obtained from an unused part of a stable or other building.

The type of pigeon house will depend largely on the climate. In the South an open-front house with plenty of ventilation is desirable, while for the colder sections a closed front is better. The house should face to the south and be on soil which drains well. A pigeon house should be made so that it will provide fresh air, sunlight, and space enough to keep the pigeons comfortable. The more sunlight in the house the better. Sunlight helps to keep the building dry and sanitary. The house must be free from drafts, and all walls except the front should be tight.



FIGURE 4.—A two-pen backyard pigeon house. This building is 12 by 16 feet and will accommodate about 50 pairs.

Interior fittings should consist of a double nest for each pair of breeders, nest bowls, and feed hopper. Double nests are necessary as the female pigeon will usually lay again before the squabs are old enough to leave the nests. The nests are usually built at least 12 inches square,

15 inches high, and 4 or 5 tiers high (fig. 5). All interior equipment should be as simple as possible to keep costs low and to facilitate cleaning.

Build the hoppers and feed troughs large enough so that the pigeons cannot waste the grain.

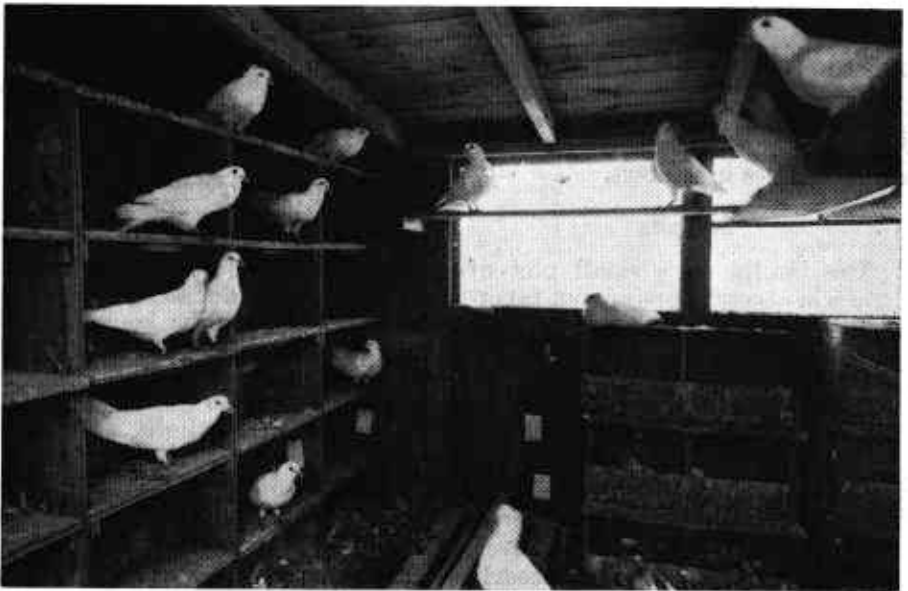


FIGURE 5.—Open-front double nests with 6-inch board in front. Nests made of egg crates are shown at right.

Provide bathing facilities in the yards so that the pigeons can bathe daily. Water for bathing helps to keep the pigeons in good health and free from insect pests. A galvanized-iron pan about 5 inches deep and from 15 to 20 inches in diameter makes a good bath pan. The pigeons will drink the bath water. These pans should be left in the pens for only 2 or 3 hours each day. Water fountains for drinking may be kept either in the yard or in the house. It is very important to keep all water utensils clean and to keep the pigeon house dry.

Sanitation is essential to successful squab production. Take all measures necessary to keep the pens and yards clean and the birds free from disease and insect pests. If one begins with healthy stock and gives it proper management no serious disease should arise in the flock. On the other hand, crowded houses, poor feeding, damp or poorly ventilated pens, lack of cleanliness in the pens and yards, and careless selection and breeding of the stock may lead to heavy losses in the flock. Disease is much easier to prevent than to cure.

Care of Breeders

Keep only mated pairs in the pen, as any unmated males are likely to disturb the pairs by fighting. The hen usually lays only two eggs, which hatch after 17 days incubation. Both parents build the nest and take turns sitting on the eggs and feeding the young until they are marketed or until they are able to take care of themselves. The hen often lays another setting of eggs when the squabs are from 2 to 3 weeks of age and leaves the feeding of the squabs from then on largely to the male.

Squabs are reared and fed by both of the parent birds on a thick creamy mixture called pigeon milk, produced in the crops of the pigeons. Pigeons usually feed their

squabs shortly after they themselves are fed and should not be disturbed at that time.

Feeding Pigeons

The ration used for feeding pigeons differs radically from that fed to other poultry. Pigeons should not be fed mash, and green feed is not necessary. A high protein grain, such as cowpeas, field peas, or peanuts, must be fed in order to get the desired protein content in the ration. As the grains of high protein content are the most expensive ingredients in the ration, it is advisable to use only as much as is needed for good growth.

The selection of the grains to use in a pigeon ration is influenced by their price and availability and by the results that have been obtained in feeding them to pigeons. Corn, kafir, peas, and wheat are the grains most commonly used. A good pigeon feed may be made up as follows:

Pigeon Feed

Ingredient	Parts by weight
Whole yellow corn	35
Kafir or milo	20
Cowpeas or field peas	20
Hard red wheat	15
Oat groats	5
Hempseed	5
Total	100

The corn in this feed may be reduced to 25 parts during the summer months. A simpler ration could be made up by omitting the oat groats and the hempseed.

A suitable mineral mixture is an essential part of the pigeon's diet, as all the grains and seeds commonly fed are low in minerals. Keep a mixture of various minerals, containing grit, oystershell, limestone, and salt, before the pigeons all the time. Limestone or granite grits are used. Crushed oystershell (medium size) provides lime (calcium) used in the formation of the eggshells and bone. Salt is essen-

tial in the diet and should make up from 3 to 5 percent of the mineral mixture. A product containing iron, such as Venetian red, is usually included. A mineral mixture containing these products may be made as follows:

Mineral Mixture for Pigeons

<i>Ingredient</i>	<i>Parts by weight</i>
Medium-sized crushed oystershell	45
Limestone or granite grit	40
Ground bone	5
Ground limestone	5
Salt	4
Venetian red	1
Total	100

Keep the mineral mixture, preferably slightly moist, before the pigeons in a hopper protected from the weather and dirt.

Many squab producers use commercial-mixed pigeon feeds; especially if they are feeding only small flocks. The quality of these feeds is usually good; and, because of the number of different grains needed, it is easier to buy them for a small flock than to mix the ration at home.

Killing and Dressing Squabs

Squabs grow very rapidly and are ready for the table at about 26 days of age or when fully feathered under their wings (fig. 6). They should be killed and dressed when they are about ready to leave the nest. If not killed at this time they will soon lose their baby fat, and their flesh will get hard and unpalatable.

Pigs

Ordinarily it is not advisable for the small tract owner to raise pigs, as he will not have enough of the necessary feeds. However, if he can raise and fatten one or two pigs chiefly with surplus garden products and table scraps, he can reduce materially the cost of his meat. If pigs are to be raised and fattened entirely on feeds that must be pur-



FIGURE 6.—Squab 4 weeks old; fully feathered under the wing and ready for market.

chased at retail prices, it is not likely that the undertaking will be profitable. An average pig will eat about 600 pounds of a balanced grain ration from weaning age of 8 weeks to a live weight of 200 pounds. However, pigs having plenty of other feed do fairly well without much grain, and if given proper quarters and care they will make satisfactory gains on feeds that would otherwise be wasted.

Almost any type of shelter will be suitable for one or two pigs that are to be fattened for slaughter. The most important considerations are to provide (1) protection from the rain or snow, (2) shade in hot weather, and (3) a floor that will enable the animals to keep dry. The pen should be located far

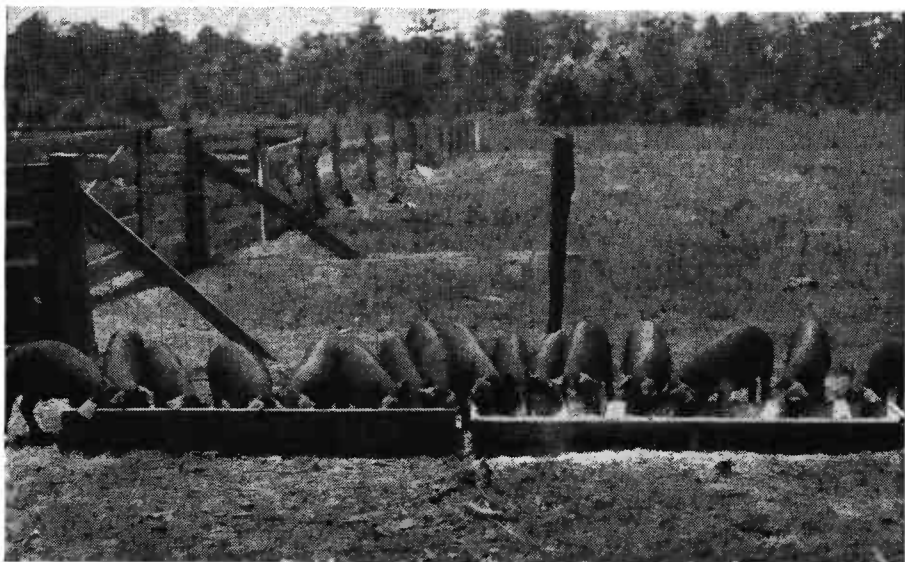


FIGURE 7.—Pigs about the right age to be weaned from their mother.

enough from any dwelling house to prevent annoyance from bad odors. Some communities have restrictions against keeping pigs within their borders. Investigate local ordinances before purchasing stock.

The best time to buy a pig is in the spring when it is being weaned from its mother (fig. 7). As a precaution against internal parasites, it is best to buy animals that have been raised on clean ground, under a plan known as the "swine sanitation system." A runty pig will seldom, if ever, make economical gains. A sow pig will usually be satisfactory, but a boar pig will not make as desirable growth as one that was castrated before being weaned. If there is any hog cholera in the neighborhood, or if garbage of any kind is to be fed, it will be necessary to get pigs that have been immunized against this disease.

Feeding Pigs

The method of feeding will depend on the kind of feed available and the type of pen or pasture. The most convenient method is to

provide grain, a protein supplement, and some minerals in separate compartments of a self-feeder. Always keep an ample supply of fresh water for drinking, and allow enough pasture to last the animal 2 or 3 weeks before the pen is changed to new ground. If pigs are allowed access to good pasture they will thrive on 10 to 15 percent less feed than if no pasture is available. If table scraps or selected garbage can be obtained from several homes or from a restaurant, such feed will materially reduce the quantity of feed to be purchased. Garbage for hog feed should not contain paper napkins, soap, washing powder, glass, other such materials, or dish water, and it should be collected at least twice a week to prevent spoilage.

Selection of grains for pigs will depend on the kinds available and relative prices.

It is not necessary to grind corn for hogs. Yellow corn is superior to white corn when fed to pigs up to about 100 pounds' weight, when they are fed in dry lot. The difference in the feeding value of yellow and white corn does not appear

when good legume pasture is available or when about 5 percent of good, leafy alfalfa hay or alfalfa meal is added to the white-corn ration. White corn is about as good as yellow corn for hogs weighing over 100 pounds even in dry lot, especially if they have previously had good pasture.

Wheat will generally give about 5 percent better feeding results than corn although its feeding value varies considerably.

Root crops are generally relished by hogs and are desirable, but not an economical feed. Good alfalfa pasture or alfalfa hay is usually more efficient.

Proso, or hog millet, is raised to some extent in the Western and Northern Plains States and is a good feed for hogs. It is lacking in protein, however, and should be ground and fed with a protein supplement.

Although pigs require mineral feeds in addition to any of the feeds mentioned, table scraps, vegetables, and other green feed will supply part of these needs. If the pig is to be raised on grains and only a small supply of table scraps, it will be advisable to supply a mineral mixture of equal parts of steamed bonemeal, ground limestone or air-slaked lime, and common salt. In sections where there is danger of goiter it is advisable to add 0.02 percent of potassium or sodium iodide to the mineral mixture.

If wood ashes are available they may be incorporated in the mineral mixture to advantage. They may be used to the extent of one-third of the above mixture by weight. Thus, 35 pounds would be the correct quantity to add to a 100-pound mixture of the ingredients listed.

A mineral mixture should be supplied to hogs in boxes or self-feeders where it will be dry and available at all times. Neither charcoal nor soft coal has much food value, but both appear to be highly palatable to pigs.

Rabbits

Almost any small-farm owner or suburban family can produce at least a part of the meat supply at reasonable cost by raising domestic rabbits. Even the home with limited yard space can be easily equipped for raising a few rabbits. Rabbits are now produced commercially for meat and fur and as a sideline on general farms and in back yards to supply families with meat.

The meat of rabbits is pearly white and fine grained and is especially desirable as a summer meat. It has about the same protein content as other lean meats. Only about 20 percent by weight of the dressed carcass of a fryer is bone. Rabbits are usually raised for home use, but in most localities the meat can be marketed to advantage and the skins may be sold to dealers.

The beginner who desires to stock a few hutches at a minimum cost may purchase either young rabbits just weaned or a few animals about ready for breeding. Young stock will, of course, cost less than mature animals, but the does will not be old enough to breed until they are about 6 to 8 months old. In any case it is desirable to obtain stock from a reliable breeder who will guarantee his animals to be as represented.

The rabbits best suited for home and commercial production of meat and fur are the medium and larger breeds, such as New Zealand, American, Bevern, French Silver, Chinchilla, and Flemish Giant. White rabbits are usually the most desirable, provided they are good meat producers, because the fur is more salable and can be dyed any color desired.

The gestation period of rabbits is 31 days. A good doe will usually raise from 6 to 8 young in a litter. She should be bred again when the young are weaned at 7 to 8 weeks of age, so as to produce 4 litters each year. Well-grown young rabbits

will be large enough to eat when about 2 months old. A rabbit of one of the medium breeds should weigh approximately 4 pounds live weight at this age. Thus a good medium-type doe should produce about 75 pounds of live 2-month-old rabbits each year, allowing for slight mortality in the litter.

Feeding Rabbits

The cost of feeding rabbits may be reduced by utilizing any suitable home-grown crops that may be available and supplementing them with commercially prepared mixtures or pellets. Rabbits may be given many kinds of feed. Those most commonly used are barley, oats, wheat, or rye, and alfalfa or clover hay. A protein supplement, such as peanut, soybean, or linseed meal, in pellet form, should constitute from 14 to 30 percent of the concentrated part of the doe's ration during the time she is suckling her young. Feed young stock without litters a ration consisting of limited quantities of grain plus protein supplement and all the good legume hay they will eat. It is advisable also to feed a small quantity of freshly cut alfalfa or clover, garden vegetables, or other green feed, to supply vitamins. Salt should be fed either by adding 1 percent in the concentrate part of the ration or by fastening a small piece of compressed salt inside the hutch where the animal can lick it.

Many rabbit growers prefer a complete pellet feed especially prepared for rabbits, because it saves labor. Approximately 400 pounds of grain and other concentrates and hay are required to feed an average-sized doe and her four litters to the age of 8 weeks, the usual weaning age for rabbits. Full feeding of a doe with a litter is desirable. A mature buck will require about 45 pounds of grain and protein concentrates a year and all the hay he will consume.

Caution: Do not feed rabbits alfalfa, clover, or grass cut from beneath fruit trees or garden crops that have been sprayed to control insects.

Hutches

Mature does should be kept in individual hutches under a shed or be provided with a roof large enough to keep out the rain (fig. 8). Large numbers of young rabbits can be placed together in developing pens properly sheltered against rain. In cold weather, does with new litters should be kept in hutches placed in a room where the young rabbits will not freeze. Many rabbit growers install self-cleaning hutches with wire floors of $\frac{5}{8}$ -inch mesh hardware cloth. Even though only a few rabbits are to be kept, such a wire-cloth bottom can be provided in a simple home-made hutch that affords plenty of ventilation and a moderate amount of sunlight. Hutches should be placed on legs about 3 feet above the ground. If wire netting is used for the front, its mesh should not be larger than 1-inch. Hutches for rabbits of medium-sized breeds should be about 2 feet high, not more than $2\frac{1}{2}$ feet deep, and 4 feet long.

The Dairy Cow

Although bottled milk, cream, and butter are now readily available at the local grocery store, it is sometimes advisable for the small-tract owner to keep a cow. If ample pasture is available and a source of hay can be depended on, it may be worthwhile to own a cow that will provide enough milk to furnish a large proportion of the family's food requirements, add variety to the diet, and provide food that is essential for good nutrition and health.

Nutrition specialists recommend from three-fourths to 1 quart of milk a day (or its equivalent in other dairy products) for a grow-

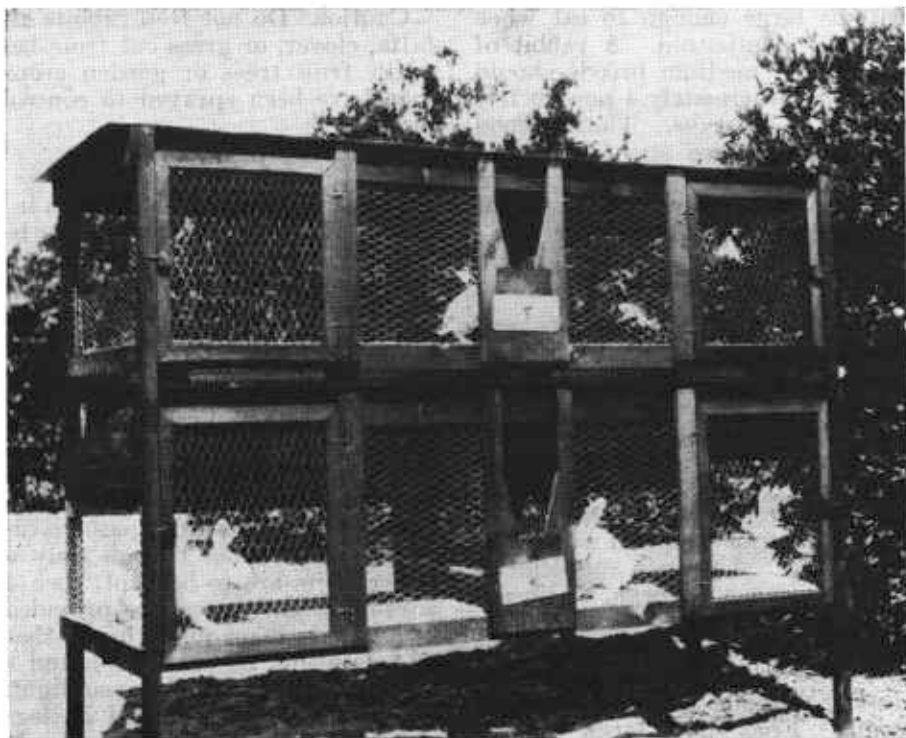


FIGURE 8.—Outdoor, double-tier rabbit hutches. Provide with solid back and nest boxes for year-round all-purpose use.

ing child, and a pint a day for an adult. According to this recommendation, a family of 2 adults and 3 children will consume from about 1,200 to 1,500 quarts of milk a year. It is desirable for a family of this size to have, in addition, 90 to 150 pounds of butter. Milk and butter together are one of the large items of expense in a well-planned family food budget.

A good dairy cow may be expected to provide all the milk and cream required by a family of five during 10 or 11 months of the year, as well as two-thirds of the butter. In addition there should be considerable skim milk for making cottage cheese and for feeding poultry.

Conditions may not permit every family on a small farm to keep a cow satisfactorily or profitably. In the first place, a comfortable and

sanitary stable must be provided, and some member or members of the family must have the time and be available every day to feed and care for the animal and do the milking. In the second place, considerable feed will be required.

A cow will eat from 2 to 2½ pounds of hay daily for each 100 pounds of body weight. Thus, a cow weighing 1,000 pounds will consume from 20 to 25 pounds of hay a day, or 3 to 4 tons a year if no pasture is available. If pasture is available for 5 months of the year, the amount of hay required will be reduced proportionately. In addition to the hay and pasture, a cow producing a medium amount of milk will require about 1 ton of concentrates.

The cost of hay will vary from \$15 to \$50 a ton, depending on the locality and on the quality of the

hay. Concentrates will cost from \$60 to \$80 a ton. In addition, from 800 to 1,600 pounds of straw should be provided for bedding. Thus, the average cost for the feed and bedding needed to keep a cow would be from \$100 to \$200 a year. The cost of these items should be figured against the price of the milk or butterfat produced to determine whether it is advantageous to keep a cow.

If a part or all of the necessary feed can be grown on the farm, the cost of keeping a cow will be reduced proportionately. Ordinarily 2 acres of good land will provide most of the feed required for 6 months of the year, which should reduce the feed cost by almost half. Generally speaking, therefore, 2 acres for growing feed may be considered a prerequisite for keeping a milk cow on a farm, and if this acreage is not available, careful consideration should be given to the probable costs and returns before a cow is purchased.

Although a fairly good cow, well fed and cared for, will as a rule produce enough milk to more than pay for the feed, even when all the feed is purchased, the family must be able to utilize all the milk, or the venture may not be profitable. Therefore, the larger the family and the greater its use of dairy products, the more valuable the keeping of a cow is likely to be.

Buying A Cow

As the cow is to be kept mainly, if not entirely, for the milk she produces, it is better to select one bred for milk production. Suitable cows may be of any of the five principal dairy breeds: Ayrshire, Brown Swiss, Guernsey, Holstein-Friesian, and Jersey. Grade cows will be cheaper and will generally serve the purpose of the small-farm owner as well as registered cows. Jerseys and Guernseys are most commonly used for family cows.

Cows of these breeds are smaller and do not require so much feed for maintenance as some of the larger breeds.

It is usually better to buy a young cow than an old one. A young cow is more likely to have a sound udder, and will have more years of production ahead. She should be old enough, however, to have demonstrated her ability as a milk producer. A cow that has had her second or third calf is preferable to either a younger or older cow.

The family cow should produce at least a medium quantity of milk. However, unless the family is prepared to give the cow the best of care and feed and use or otherwise dispose advantageously of a large quantity of milk, there is no particular object in buying a very heavy producer. Also, the more milk the cow gives the greater the purchase price is likely to be. Consult previous production records for the cow if they are available. A cow with a butterfat production record of at least 300 pounds a year made with ordinary feed and twice-a-day milking should be satisfactory. At least 250 pounds of butterfat a year will be normal production for an average cow with her first calf. If previous records are not available for examination, a cow that is giving 25 or 30 pounds of rich milk a day 2 or 3 months after calving or 15 pounds 8 or 9 months after calving should be satisfactory.

It is well for the prospective owner to buy a cow as near to his home as possible so that he will have a better opportunity to observe the qualities of the cows offered for sale and to know the reputation of the seller. Moreover, he will be able to lead the cow home or take it by truck, thus avoiding costly transportation charges.

An inexperienced person should not attempt to buy a cow unaided. The county agent or some compe-

tent farmer in the community should be called upon for advice and help.

Health and Habits of the Cow

The cow selected should have a sound udder with teats of good size, and she should be easy to milk. The buyer should see her milked, or, preferably, he should milk her himself. The udder should contain no lumps or hardened tissue. Avoid cows with large meaty udders that do not shrink with milking. The milk should be free of clots, flakes, or strings. To examine the milk for these abnormalities, several streams of the first milk should be drawn from each teat on a piece of close-woven black cloth stretched over a tin cup.

Choose a cow that has no evidence of bad habits. Such habits as kicking, self-sucking, or breaking through fences are not easy to detect by casual observation, but one should at least avoid buying cows that wear yokes, muzzles, or nose pieces.

Since tuberculosis has been almost completely eradicated among cattle in the United States, brucellosis is now considered the most serious infectious disease of dairy cattle. Brucellosis causes abortions in cattle; when transmitted to man it causes undulant fever. If possible, select a cow from a herd known to be brucellosis-free. Unless it is certain that the cow is free from brucellosis, buy her subject to test. Many States have laws requiring that all cattle brought into a State must pass a test indicating they are free from brucellosis. It is unlawful to ship from any State for dairy or breeding purposes cattle that have not been tested and found free from brucellosis and tuberculosis.

The Cow Barn

The stable provided for the family cow should be comfortable but it need not be expensive. The cow

may be left untied in a box stall about 10 feet square, or she may be confined in a smaller space and held with a stanchion, chain, rope, or strap. The box stall allows the cow more freedom but requires approximately three times as much bedding as the other type of stall. It is easier to keep a cow clean in the smaller type of stall than in the box stall unless the box stall is kept well bedded. If a cow is confined with a stanchion, the space where she stands should be $3\frac{1}{2}$ or 4 feet wide and about $4\frac{1}{2}$ feet long. There should be a manger in front, extending about $2\frac{1}{2}$ feet beyond the platform on which the cow stands. Behind the cow there should be a gutter 6 or 8 inches deep and 16 inches wide. Behind the gutter there should be 4 or 5 feet of space to facilitate removal of manure and to permit the cow to get in and out of the stall. There may be a space in the front of the manger so that the feed can be given to the cow from the front, or it can be carried in from the rear of the stall. There are other less common types of stalls which would prove satisfactory.

If the cow is confined by a stanchion, the sides of the stable should be so constructed as to prevent drafts in cold weather. This is not so important if she is kept in a box stall. Except in the colder climates the box stall may be entirely open on the south side if the other three sides are tight. An arrangement which permits the sun to shine into the box stall adds much to the comfort of the cow in cold weather. A stall that is entirely enclosed can best be ventilated by a tilting window, preferably on the side opposite to the prevailing winter winds. The stable, of course, should have windows enough to provide the necessary light.

Summer Feed

The small-farm owner should try to raise all or nearly all the feed

required for the 6 warmer months of the year. It is perhaps better to plan to buy the winter feed than to raise it because of the extra acreage, machinery, and horsepower or other power that would be required.

If a cow is to be kept, at least 2 acres of good land should be devoted to raising feed. Much, if not all, of this land should be in permanent pasture. Pasture is the easiest of all crops to raise, and after it is once established does not require much expense for maintenance. Moreover, pasturage is desirable for the proper nutrition and continued well-being of the dairy cow.

Few, if any, grasses or mixtures of grasses can be depended on to provide a uniform supply of feed throughout the summer. The common grasses and clovers such as bluegrass, orchard grass, redtop, and white clover, used for pasture in the central and northern parts of the United States as well as in the irrigated regions of the West, make a rapid growth in the spring but a much slower growth in the dry, hot season. At that time the pasture must be supplemented with some other feed, such as pasture plants which make most of their growth in midsummer, green harvested crops, or grain and cured hay.

Kentucky bluegrass and white Dutch clover grown together constitute the standard pasture mixture on all soils that are reasonably fertile and not too sandy, in the central, northern, and eastern parts of the United States. Lespedeza makes most of its growth in midsummer and thrives as far north as the southern boundary of Pennsylvania and southern Iowa. A good plan to follow in regions where both bluegrass and lespedeza do well is to seed 1 acre of the pasture to Kentucky bluegrass and white Dutch clover, and 1 acre to lespedeza. This is the easiest and cheapest way to provide plenty of summer feed.

Farther north, where lespedeza does not thrive it is better to plant

a mixture of Sudan grass and soybeans on, say, a half acre next to the bluegrass pasture. This may be pastured, or such quantities as are needed may be cut daily with a scythe and thrown over the fence into the bluegrass pasture for the cow. Any of the Sudan grass and soybean mixture not needed to supplement the bluegrass may be made into a shock or small stack and fed to the cow after frost in the fall.

In the South, Bermuda grass, carpet grass, Dallis grass, and lespedeza make a good growth in the summer but do not come on early in the spring. The problem in the South is to supplement these crops in the winter and spring. It is suggested that 1 acre be devoted either to the grasses mentioned or to lespedeza or to both and that 1 acre be seeded in the fall to oats, rye, barley, or wheat to provide winter and spring grazing.

The garden can be expected to furnish a small part of the summer cow feed. Pea vines, sweet-corn stalks, cabbage leaves, and sweet-potato vines may be fed to the cow.

Winter Feed

As a rule the winter feed for the family cow will consist of hay or other forage and a mixture of concentrates. Because of the equipment needed for harvesting hay, it is not ordinarily advisable for the small-farm owner to make any except possibly from some small quantity of green crops that may not have been needed for summer feeding.

Alfalfa, soybean, alsike clover, or early cut grass hay will prove satisfactory for winter feed. These hays should be leafy and have a good color. Buy from some farmer nearby, if possible, to save transportation charges. The quantity of the hay and concentrates to feed will depend on their relative costs and also on the quantity and richness of the milk produced. Feed a Jersey

or Guernsey cow of ordinary size not less than 14 pounds of hay a day. This amount of hay along with a pound of grain for each 2 to 4 pounds of milk produced will furnish all the nutrients required. Sixty pounds of concentrates will furnish as much nutrients as 100 pounds of hay. If 60 pounds of concentrates cost more than 100 pounds of hay, feed as much hay as the cow will clean up without waste, and reduce the concentrate allowance accordingly. If hay is relatively cheap and of very good quality and the cow is not producing a very large quantity of milk, it may not be necessary to feed any concentrates at all.

A mixture of ground corn and wheat bran will prove satisfactory for use with any kind of hay. When the mixture is used with grass hay, fodder, or mixed hay, add some cottonseed meal to provide the necessary protein. A ready-mixed milk-producing feed of a reliable brand may be used in place of the mixture of ground corn and wheat bran.

Sometimes it is possible to buy good corn stover locally at a very reasonable price. If the cow is fed all the good corn stover she will eat and a mixture of wheat bran and cottonseed meal in addition, she will get along very well unless she is producing more than 12 pounds of milk a day. More feed, and a greater variety of feed, will be required when the cow produces more than this quantity.

The cow should be watered at least twice a day in winter and more often in the summer. See that ducks, geese, or dogs do not soil the water supply, and exclude chickens from the manger and feed of the cow.

Care of the Cow

A cow should always be handled gently and quietly. Dogs should not be allowed to worry or chase her. See that all fences are well

constructed so that the cow will not develop a habit of breaking through. If the cow is always where she belongs, there will be no occasion for chasing or running her. A fence made of four barbed wires, tightly stretched and fastened to good posts, will keep any ordinary cow in a lot.

The cow should be brushed daily, especially in the winter. Manure should not be allowed to cake on the flanks and thighs as so often happens with cows that are not groomed regularly, especially when they are confined in poorly constructed stalls with little bedding.

Most dairymen plan to have their cows freshen at about 12-month intervals and to have them dry for a month or 6 weeks before freshening. Ordinarily, this practice results in a greater yield of milk than a longer interval between calvings. In some areas the services of an artificial-breeding association may be available.

Before milking see that the udder and flanks of the cow are free of any dirt that may drop into the milk pail. If necessary, wash any soiled parts. Wipe the udder and flanks with a clean damp cloth. Milk only with clean, dry hands. Use a small-top pail and milk with both hands, drawing the milk quickly with as little discomfort to the cow as possible. The finger nails should be kept short. Milk tubes or straws should not be inserted in the teats.

Care of the Milk

As soon as the milk is drawn it should be strained and then cooled by being set in cold water. The temperature of the milk should be reduced to 50° F. or lower as quickly as possible. Before use, the milk should be pasteurized by heating it to a temperature not lower than 143° and holding at that temperature for not less than 30 minutes, or to a temperature not lower than

161° and holding at that temperature or above for not less than 15 seconds. After pasteurization, the milk should be cooled rapidly to 50° or lower. When it is cool, part of it may be placed in milk bottles and kept in the refrigerator or other cool place until used. The part not needed for immediate use or for use as whole milk may be placed in a can or other container having a small diameter but relatively deep, for the cream to rise. In 24 hours the cream may be skimmed off for butter making, and the skim milk may be used on the table, for cooking, for making cottage cheese, or it may be fed to poultry.

All milk utensils should be rinsed in cold or lukewarm water immediately after use, then scrubbed with a good brush and hot water containing a dairy washing powder or dairy detergent. After they are washed, utensils should be rinsed thoroughly with hot water, then either scalded with boiling water or treated with a dairy sanitizer. Single-use strainer cloths are preferable; however, if the strainer cloths are to be reused, they should be washed and then boiled after each use. After the utensils have been sanitized, put them in a clean, airy place to dry out, but protect them from dust, flies, and other contamination. Exposure to sunshine will help keep the utensils sweet. Pails and cans should have rounded joints and soldered seams so there will be no crevices in which milk can lodge and cause spoilage.

Making Butter At Home

When the quantity of cream obtained each day is small, it may be accumulated for 3 or 4 days and churned at one time, but it should be kept cold to prevent it from getting too sour. Butter made from cream that is too old or too sour has a strong flavor and does not keep well. Clean-flavored cream that is sweet or mildly sour may be made into

high-quality butter. It should be churned at a temperature that will cause butter to form in firm granules. This temperature depends on the season of the year and other factors but is usually between 54° and 58° F. in summer and between 58° and 64° in winter. The butter should be washed when in the granular condition in order to remove as much buttermilk as possible. After the wash water has drained off, salt should be added at the rate of one-half to three-fourths of an ounce to each pound of butter and the butter then worked until there is a thorough and even distribution of salt. Too much working, however, or working the butter when very soft, produces a sticky, salty body and a dull appearance. Properly worked butter has a waxy body and a bright appearance.

Milk Goats

The small-farm operator whose family is small may find it more economical and convenient to obtain his milk supply from one or two milk goats than to buy milk or to attempt to keep a cow. With proper care and feed, a good milk goat will produce at least 2 quarts of milk daily for from 8 to 10 months of the year. Two goats, if bred to freshen at different seasons, should produce a regular supply of milk sufficient for a family of 3 or 4 persons. In localities where goats are raised, prices commonly range from \$15 to \$50 or more, depending on the breeding and production records. Goats from unusually good strains sometimes are valued in excess of \$100. It is well to buy goats as near home as possible in order to keep transportation costs to a minimum. Sometimes it is possible to rent goats.

Goats kept for milk production do well on the same feeds used for milk cows. Ordinarily one milk goat, or doe, as she is commonly called, will require from one-eighth

to one-sixth as much feed as is required by a cow. The home garden should furnish much feed suitable for a goat, such as vegetable tops, pea vines, and corn stover. There is usually an abundance of grass or other vegetation along fence rows that may be utilized by a goat, and almost any member of the family can attend to milking the animal and tethering it where it can get feed.

Goat's milk is nearly always pure white in color. One of its chief characteristics is the small size of the fat globules. The cream rises very slowly and never so completely as that in cow's milk, making impractical the method of obtaining cream by allowing it to rise. However, cream may be obtained from goat's milk by using a cream separator.

Goats are easily housed. They require only shelter enough to protect them from wind, rain, and snow. They are natural climbers and, if given the opportunity, they will climb on low sheds, farm machinery, and even automobiles left in the yard.

Does come in heat regularly between September and March. After this time they ordinarily cannot be bred until late in August. The period between heats varies from 5 to 21 days, and does usually remain in heat from 1 to 2 days. The gestation period (the time elapsing between service and the birth of young) averages 149 days, or about 5 months. Does usually give birth to 2 kids, but some does may have 3 or even 4 at one kidding.

Feeding for Milk Production

When does are producing milk, feed them all the roughage they will consume, such as clover, alfalfa, mixed hay, or corn stover. Give them a liberal supply of such roots as turnips, mangels, carrots, or parsnips. Silage is also relished by goats and may be fed instead of

roots. Though it would not be practical to put up silage merely for a few animals, arrangements can sometimes be made to buy small quantities of this feed from a nearby farmer. The grain feeds best suited for milk goats are corn, oats, corn bran, cottonseed meal, and brewer's grains. Goats also relish browse of underbrush, but such feed alone is not conducive to good milk production.

A good ration that has proved very satisfactory for does in milk during the winter season consists of 2 pounds of good alfalfa or clover hay, 1½ pounds of roots (carrots, turnips, etc.), and from 1 to 2 pounds of grain. The grain mixture consists of 100 pounds of corn, 100 pounds of oats, 50 pounds of bran, and 25 pounds of linseed meal. When the does are on pasture, feed them from 1 to 1½ pounds of grain per day of the mixture.

Cleanliness is essential in feeding goats. They seldom eat paper or trash, and they require an adequate quantity of good, wholesome feed and fresh water. Keep rock salt before them and occasionally mix a small quantity of fine salt with the grain.

Female goats kept in clean surroundings do not have an objectionable odor. This condition occurs principally in bucks.

Feed pregnant does all the roughage they will consume during the fall and early winter, together with 1 pound of roots or silage and ½ to 1 pound of grain of the same mixture as that fed to does in milk. Take special care to see that silage fed to does is of good quality. Never feed frozen or moldy silage. Feed turnips, silage, or any other highly flavored feeds after milking; remove from the feed box any feed not consumed. Pregnant does require plenty of exercise to produce strong, healthy kids.

A mature doe which has good pasture during the crop season will



FIGURE 9.—Milking stand and method of milking a goat. Such a stand may be built at small cost.

eat about 500 pounds of hay and 450 pounds of grain a year.

The lactation period, that is, the time that a doe produces milk, varies considerably among different breeds and types of goats. A lactation period ranging from 8 to 10 months is considered satisfactory. A thrifty and properly fed doe that gives milk less than 6 months should not be kept.

Milking A Goat

In milking a goat it is more convenient to use a stand with a stanchion at one end and a seat for the milker at one side. As young does usually object at first to being milked, the stanchion arrangement shown in figure 10 is an excellent method of confining them. For the first few times at least it is best to give the does a little grain feed in the box attached to the stanchion.

Does soon become accustomed to being milked, and after a few times they will jump up on the stand and put their heads through the stanchion without assistance. It may be necessary to milk a heavy producer three times a day for a short time after freshening, but twice a day is sufficient for most does.

Raising the Kids

The question of whether or not to raise the kids merits special consideration by the family on a small tract where green feed is limited, especially if the milk is needed for home use. If the kids are not to be raised, dispose of them when they are only a few days old.

It is not difficult to raise kids by hand with either goat's milk or cow's milk. In any case, it is best to allow the kids to remain with the

doe for 2 days so that they may obtain the colostrum milk.

Diseases of Goats

Like cattle, goats are subject to brucellosis. They should either be selected from a herd known to be free of this disease or subjected to a test for brucellosis, preferably by an authorized agent of the State, before being put into service as milk goats.

Goats are rarely affected with tuberculosis. When confined to close quarters with cows that have tuberculosis, however, they may contract the disease. Goats in good condition are not very likely to contract disease.

Emaciation indicates the presence of abnormal conditions or diseases, such as stomach worms, tapeworms, other internal parasites, or abortion. These conditions are best treated by a veteri-

narian, although minor ailments, such as the following, may be treated by the goat owner.

Caked udder, or mastitis, should be cared for carefully. When this condition is present, the udder feels hard and is hot. The best treatment is to bathe the udder thoroughly with warm water several times a day and, after thorough drying with a cloth, rub on a little lard. It is well also to give a dose of epsom salts.

Goats that are not properly managed may become affected with foot rot. The first evidence of this trouble is a slight lameness, which rapidly becomes more marked. The foot becomes swollen and warm to the touch. To treat foot rot, trim the affected foot thoroughly so as to expose the seat of infection; then soak it in a saturated solution of copper sulfate. Pine tar applied to the parts promotes healing after the infection has been controlled.